Canon

CANON INDUSTRIAL PRODUCTS
ENABLING A WORLD OF INNOVATIONS

Canon Industrial Products Division

Canon Industrial Products find their origins on Canon production lines where they are used in the manufacturing of Canon branded products. Canon's ability to provide internal manufacturing innovations helps provide a strategic advantage and Canon leverages R&D efforts by providing Canon Industrial Products to global manufacturing organizations around the world.

Canon has the resources and the commitment to develop ultra-precision imaging, deposition, and automation product technologies to help achieve high performance and value. This enlightened thinking is the unique Canon value that helps contribute to a high return on investment for our customers.

LITHO PRODUCTS

Semiconductor
Equipment

Flat-Panel Exposure

ANELVA PRODUCTS

ANELVA Panel
Products

ANELVA PVD
and Etch

X-Ray Source

Vacuum
Components

OPTOMECHATRONIC PRODUCTS
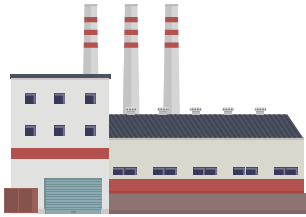
DC Micro Motors

3-D Machine Vision

Surface Reflectance
Analyzer

Optoelectronic
Products

CANON INDUSTRIAL PRODUCTS
ENABLING A WORLD OF INNOVATIONS

Industrial Manufacturing

High-Tech Manufacturing

Sensors and IoT

PC and Mobile

Display and AR/VR

Automotive

Medical

Green Home

Wearables

Lithography and Flat-Panel Exposure Systems

Canon Photolithography and Flat-Panel Exposure Equipment have been designed to help provide exceptional quality, performance and cost of ownership for wafer and panel imaging applications.

Canon FPA (Fine Pattern Aligner) Series i-line and Deep Ultraviolet (DUV) lithography systems are used in the fabrication and heterogeneous integration of high-tech devices including integrated circuits, hard disk read/write heads, Microelectromechanical Systems (MEMS) devices, image sensors, displays, power devices and Light Emitting Diodes (LED).

Canon MPAsp (Mirror Pattern mask Aligner Smart Platform) Series panel exposure systems utilize mirror projection technology for fabrication of high-resolution displays required for Ultra-High Definition television, monitor, mobile, wearable and AR/VR display applications.

LITHO PRODUCTS & TARGET APPLICATIONS

Litho Products	Technology	Resolution	Lens Red.	Field Size	Substrate Options	MRAM	Logic & MPU/GPU	3D-NAND & DRAM	HDD & SCM	Power & Automotive	Waveguide and RF	Advanced Packaging	Optics & Photonics	MEMS, Sensors & IoT	Image Sensors	5G and Data Centers	Wearables	AR/VR & Display	LED, MicroLED	OLED, MicroOLED
FPA-6300ES6a	KrF (248 nm) Scanner	≤ 90 nm	4:1	26 x 33 mm	200 mm 300 mm	✓	✓	✓	✓						✓	✓	✓	✓		
FPA-6300ESW	KrF (248 nm) Scanner	≤ 130 nm	3.125:1	33 x 42.2 mm	200 mm 300 mm				✓			✓			✓	✓	✓	✓		
FPA-5550iZ2	i-line (365 nm) Stepper	≤ 280 nm (2/3 Ann.)	4:1	26 x 33 mm	200 mm 300 mm	✓	✓	✓	✓			✓			✓	✓	✓	✓	✓	✓
FPA-5520iV	i-line (365 nm) Stepper	≤ 1.0 µm ≤ 0.8 µm*	2:1	52 x 34 mm	300 mm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FPA-5510iX	i-line (365 nm) Stepper	≤ 0.5 µm	2:1	50 x 50 mm	300 mm					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FPA-3030EX6	KrF (248 nm) Stepper	≤ 150 nm	5:1	22 x 22 mm	≤ 200 mm	✓	✓	✓	✓	✓	✓	✓			✓	✓			✓	
FPA-3030i5+	i-line (365 nm) Stepper	≤ 350 nm	5:1	22 x 22 mm	≤ 200 mm	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	
MPAsp-E813H	Mirror Projection	≤ 1.5 µm	1:1	750 x 1,100 mm	1,500 x 1,850 mm (Gen 6)											✓	✓	✓		✓
MPAsp-H1003T	Mirror Projection	≤ 2.0 µm	1:1	750 x 1,320 mm	2,200 x 2,500 mm (Gen 8)											✓	✓	✓		✓

✓ Compatible

* = Options Required
All options may not be avaiable on all models. Contact Canon for details.

FPA-6300ES6a High-Resolution KrF Scanner

The FPA-6300ES6a [ES6a] is a DUV Scanner that offers scalability to support next-generation semiconductor manufacturing. The ES6a is an all in one solution providing high throughput, high alignment accuracy, and fine resolution for both 200 and 300 mm wafer processes.
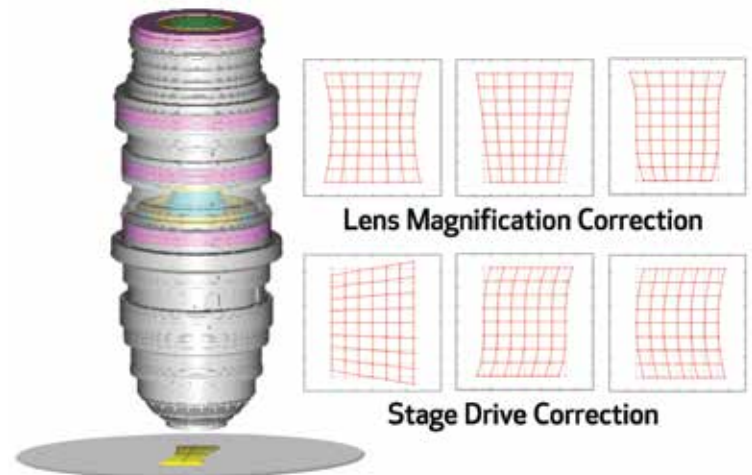
ES6a Scanners help reduce total cost of ownership by continuously upgrading the reliable and extendable single stage 6300 platform.
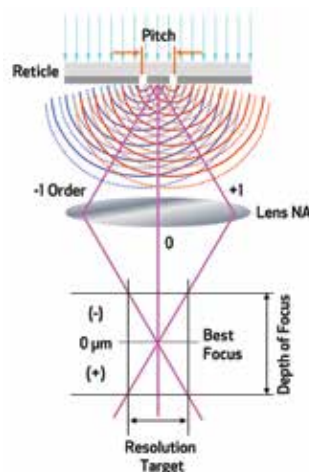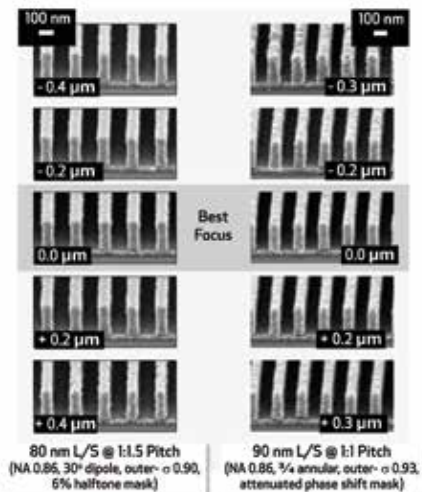
FPA-6300ES6a FEATURES

- Resolution ≤ 90 nm
- High-Throughput Mode:
    - Throughput ≥ 260 wafers per hour*
- High-Overlay Mode:
    - Mix-&-Match Overlay (MMO) ≤ 5 nm*
    - Single Machine Overlay (SMO) ≤ 3 nm*
- Advanced stage, alignment scope and precise temperature control improve overlay accuracy

KEY OPTIONS

- 200 or 300 mm wafer handling
- Shot-Shape High-Order Correction (SSHOC)
- Each Shot High-Order Correction (ESHOC)
- Wide-Band Off-Axis Scope (WB-OAS)
- Focus Accuracy Improvement (F-MAP)
- Advanced Flexible Illumination System (AFIS)

Lens Magnification Correction

Stage Drive Correction

The Shot-Shape High-Order Correction (SSHOC) option can improve overlay matching by actively controlling lens magnification and stage position during scan exposure.

80 nm L/S @ 1:1.5 Pitch (NA 0.86, 30° dipole, outer-σ 0.90, 6% halftone mask)

90 nm L/S @ 1:1 Pitch (NA 0.86, ¾ annular, outer-σ 0.93, attenuated phase shift mask)

FPA-6300ES6a provides a large depth of focus for processes requiring resolution below 90 nm.

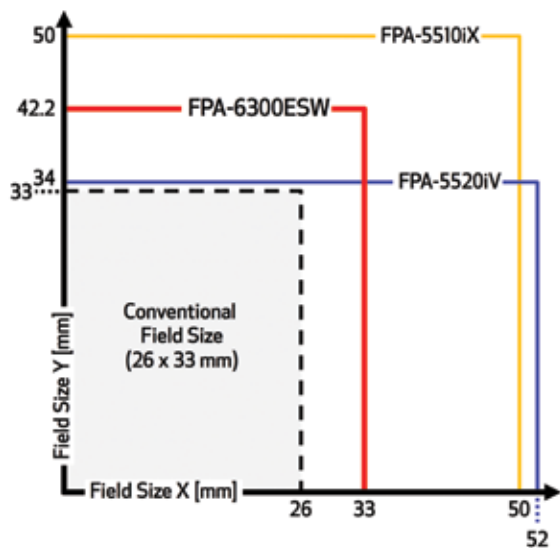| SPECIFICATIONS	
Technology	KrF Scanner (248 nm)
Resolution	≤ 90 nm
Throughput	≥ 260 wph* (300 mm)
Single Machine Overlay	≤ 3 nm*
Mix and Match Overlay	≤ 5 nm*
Numerical Aperture	0.50 – 0.86
Lens Reduction Ratio	4:1
Exposure Field	26 x 33 mm
Substrate Size Options	200, 300 mm
Dimensions (W x D x H)	2.3 x 5.2 x 2.9 m

* = Option Required

FPA-6300ESW Wide Field KrF Scanner

FPA-6300ESW [ESW] wide-field DUV Scanners are capable of 130 nm resolution across a large exposure area. The ESW adopts a unique 3.125X reduction projection lens to yield a large 33 x 42.2 mm for large device fabrication without stitching.

Originally designed to support CMOS Image Sensor and color filter production on 300 mm wafers, the ESW can be configured to support 200 or 300 mm wafer processes including Sensor, Advanced Packaging and Display manufacturing.

FPA-6300ESW Scanners are Canon's highest resolution, large-field lithography systems supporting production of large sensors, displays and packages without shot stitching.
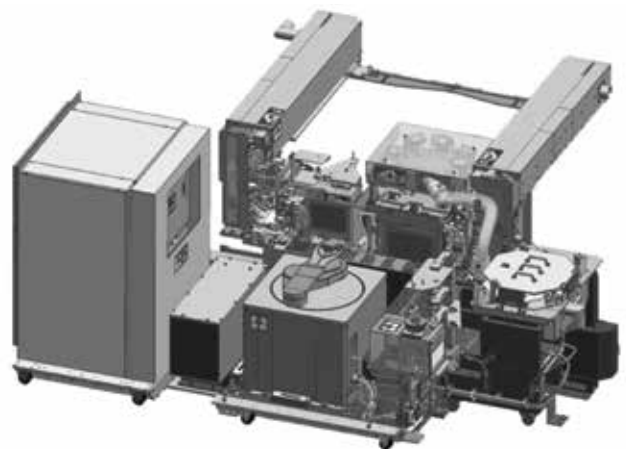
FPA-6300ESW FEATURES

- Lens Reduction 3.125:1
- Expanded field size from 26 x 33 mm to 33 x 42.2 mm
- Flexible alignment solutions including alignment through multi-color RGB photo resist
- Proven FPA-6300 Platform

KEY OPTIONS

- 200, 300 mm wafer handling
- Wide-Band Off-Axis Scope (WB-OAS)
- Advanced Flexible Illumination System (AFIS)
- Focus Spot Automatic Chuck Cleaning
- CD Uniformity Improvement
- Standard Mechanical Interface Over Head Transport Kit (SMIF-OHT)

FPA-6300 Scanners and FPA-5550 Steppers can be configured for 200 mm or 300 mm processes.

SPECIFICATIONS

Technology	KrF Scanner (248 nm)
Resolution	≤ 130 nm
Throughput	≥ 210 wph (300 mm)
Single Machine Overlay	≤ 9 nm
Numerical Aperture	0.45 – 0.70
Lens Reduction Ratio	3.125:1
Exposure Field	33 x 42.2 mm
Substrate Size Options	200, 300 mm
Dimensions (W x D x H)	2.3 x 5.2 x 2.9 m

FPA-5550iZ2 High-Resolution i-line Stepper

FPA-5550iZ2 [50iZ2] i-line Steppers offer a low cost Mix-&-Match lithography solution for advanced Logic, Memory and Sensor fabrication. 50iZ2 Steppers also support growing demand for Internet-of-Things (IoT) device fabrication on both 200 and 300 mm wafers.
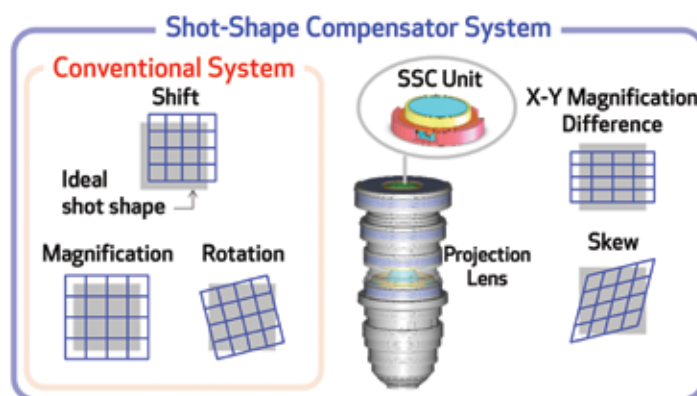
The 50iZ2 offers a balance between productivity and alignment accuracy. Throughput upgrades include calibration, alignment, exposure & wafer transfer sequence optimization, and reduced wafer lot exchange times. Overlay matching can also be improved through shot-specific intra-field compensation.

FPA-5550iZ2 FEATURES

- Throughput ≥ 230 wafers per hour* for 200 or 300 mm wafers
- Shot-Shape Compensator (SSC) Unit improves overlay matching accuracy by adjusting intra-field magnification and skew of each shot

KEY OPTIONS

- Enhanced AGA (EAGA, die-by-die overlay)
- Off-Axis Scope 2 (OAS2) Infrared (IR) Alignment scope for Color Filter (CF) & Backside Illuminated (BSI) applications
- 200, 300 mm wafer handling
- Oxygen Concentration Control System (OCCS)
- Reticle Thermal Expansion Compensation (RTEC)

Shot-Shape Compensator (SSC) Unit compensates for intra-field X & Y magnification and skew differences of each shot to improve overlay matching and yield.

Overlay Error 3σ [nm]	No Compensation	w/ EAGA Compensation	w/EAGA & SSC Compensation
X	99.1	37.0	22.7
Y	93.4	42.5	19.5

FPA-5550iZ2 Steppers can improve overlay matching in Backside Illumination processes using the optional Enhanced AGA (EAGA) and Shot Shape Compensator (SSC) functions.

SPECIFICATIONS

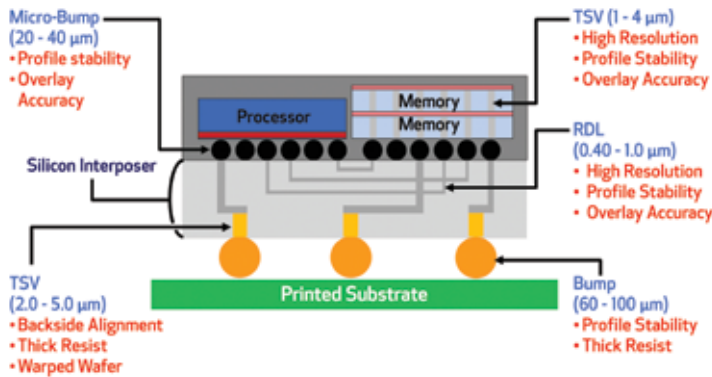|	
Technology	i-line Stepper (365 nm)
Resolution	≤ 280 nm (2/3 Ann.)
Throughput	≥ 230 wph* (300 mm)
Single Machine Overlay	≤ 15 nm
Mix and Match Overlay	≤ 20 nm*
Numerical Aperture	0.45 – 0.57
Lens Reduction Ratio	4:1
Exposure Field	26 x 33 mm
Substrate Size Options	200, 300 mm
Dimensions (W x D x H)	2.3 x 3.66 x 3.0 m

* = Option Required

FPA-5520iV Advanced Packaging i-line Stepper

FPA-5520iV [20iV] Steppers address next-generation Fan Out Wafer Level Packaging [FOWLP] challenges as demand for cost effective back-end high-resolution processes increases.

Available options supporting future FOWLP processes include the new High-Resolution (HR) Option that equips the 20iV with newly design projection lens with a maximum Numerical Aperture (NA) of 0.24. The 20iV-HR can provide 0.8 µm resolution patterning for high-density VIA and Redistribution Layer (RDL) processes.

20iV warpage compensation and die-by-die overlay options also support fabrication of multi-die Fan-Out packages by compensating for the substrate distortion and die-shift that is common in FOWLP processes.

FPA-5520iV Steppers support a variety of Advanced Packaging process requirements including patterning of deep etching and plating masks.

FPA-5520iV FEATURES

- Resolution ≤ 0.8 um*
- Lens Reduction 2:1
- Wide Field 52 x 34 mm
- 20iV Steppers offer a wide exposure field, while balancing resolution and Depth of Focus (DoF) for thin and thick, positive and negative resist processes
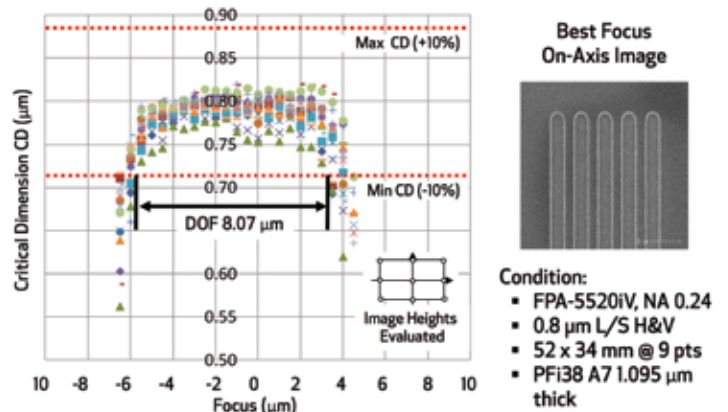
KEY OPTIONS

- High-Resolution (HR)
- Enhanced AGA (EAGA, die-by-die overlay)
- Through Silicon Alignment (TSA) System
- Resist Outgas Exhaust System
- Wafer Warpage: Wafer Vacuum Assist (WVA)

SPECIFICATIONS

Technology	i-line Stepper (365 nm)
Resolution	≤ 1 µm (0.8 µm)*
Throughput	≥ 160 wph (300 mm)
Single Machine Overlay	≤ 150 nm (Front) ≤ 500 nm (Back)*
Numerical Aperture	0.15 – 0.18 (– 0.24)*
Lens Reduction Ratio	2:1
Exposure Field	52 x 34 mm
Substrate Size Options	300 mm
Dimensions (W x D x H)	2.3 x 3.34 x 2.7 m

* = Option Required

Canon FPA-5520iV HR Option provides sufficient Depth of Focus (DoF) to support 0.8 µm RDL and VIA processes.

FPA-5510iX Wide-Field, High-Resolution i-line Stepper

FPA-5510iX [10iX] Steppers provide high-resolution imaging across large exposure area and compatibility with a range of advanced functions. 10iX Steppers offer a large 50 x 50 mm exposure field allowing users to improve imaging performance and productivity by avoiding stitching of adjacent shots to expand field size.
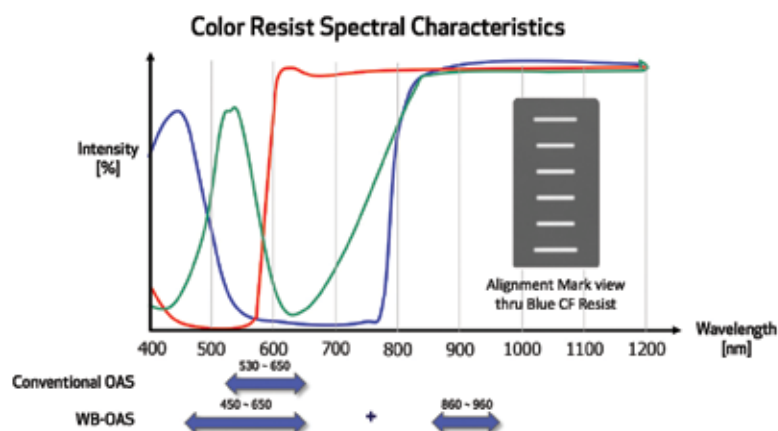
Originally designed for image sensor Color Filter (CF) fabrication, the 10iX can be extended to provide high-resolution pattern for Field Programmable Gate Array (FPGA), Advanced Packaging, display and other large device applications.
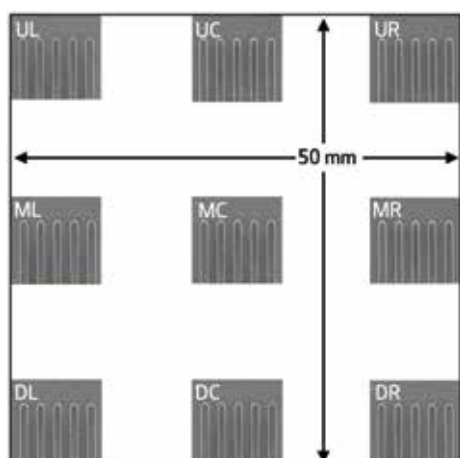
FPA-5510iX FEATURES

- Exposure Field 50 x 50 mm (max Φ 70.7 mm)
  - X max = 52 mm
  - Y max = 56 mm
- Stepper Alignment Options enable overlay process optimization for Color Filter (CF) and Backside Illuminated (BSI) Processes

KEY OPTIONS

- Wide Band Off-Axis Scope (WB-OAS)
- Oxygen Concentration Control System (OCCS)
- Enhanced AGA (EAGA, die-by-die overlay)
- 200, 300 mm wafer handling
- Resist Outgas Exhaust System
- PC Remote Console
- Online Functions (GEM2, GEM0304)

The Wide Band Off-Axis Scope (WB-OAS) can provide infrared wavelength alignment light enabling measurement through silicon and red, blue and green color filter resists.

FPA-5510iX Steppers feature a large exposure field and 500 nm resolution capability.

SPECIFICATIONS	
Technology	i-line Stepper (365 nm)
Resolution	≤ 500 nm
Throughput	≥ 145 wph (300 mm)
Single Machine Overlay	≤ 50 nm
Numerical Aperture	0.28 – 0.37
Lens Reduction Ratio	2:1
Exposure Field	50 x 50 mm
Substrate Size Options	200, 300 mm
Dimensions (W x D x H)	2.3 x 3.34 x 2.7 m

* = Option Required

FPA-3030i5+ i-line Stepper for IoT and MEMS Devices

The FPA-3030i5+ [30i5+] Steppers deliver performance and flexibility required for manufacturing and R&D environments and support a variety of substrate materials, diameters and thicknesses.

The 30i5+ is able to support a range of innovative Internet-of-Things (IoT) applications and can configured to process wafers from 75 mm (3") to 200 mm (8") in diameter. 30i5+ systems can also be configured to handle two different wafer sizes with the Multi-Wafer Handling Kit option.

The resolution, overlay, productivity and available options of the 30i5+ make it a cost-effective solution for challenging ≤ 200 mm wafer processes.

Through-Silicon Alignment Option enables measurement of back-side alignment targets through full-thickness silicon wafers.
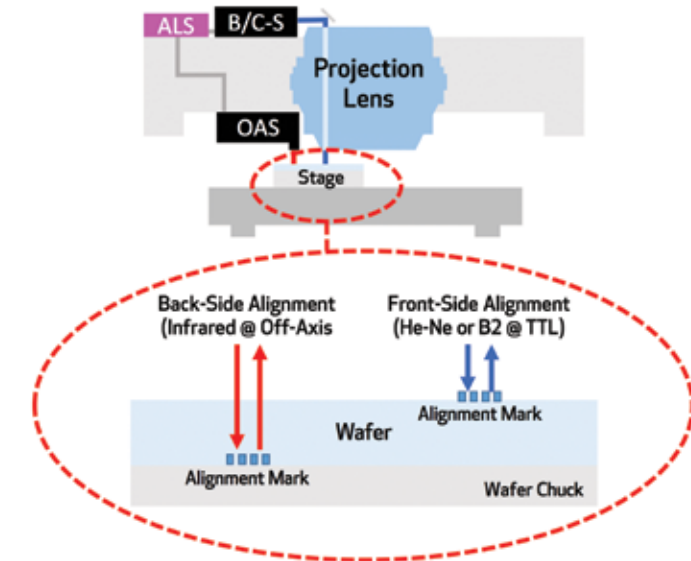
FPA-3030i5+ FEATURES

- Resolution ≤ 350 nm
- Lens Reduction 5:1
- Substrate handling capability: 75, 100, 150, 200 mm
- FPA-3030i5+ Steppers leverage and extend proven Canon FPA-3000 Stepper designs

KEY OPTIONS

- Through Silicon Alignment (TSA) Scope
- Multi-Wafer Size Handling Kit
    - 75 & 100 mm, 100 & 150 mm, 150 & 200 mm
- Warped/Bonded/Transparent Wafer Handling
- Enhanced AGA (EAGA, die-by-die overlay)
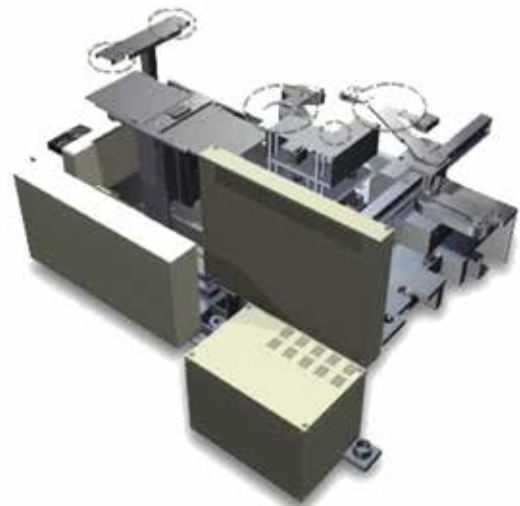- Canon Built-In Metrology (CanoMap)
- Online Functions (GEM2, GEM0304)

SPECIFICATIONS

Technology	i-line Stepper (365 nm)
Resolution	≤ 350 nm
Throughput	≥ 105 wph (200 mm)
Single Machine Overlay	≤ 40 nm (Front) ≤ 500 nm (Back)*
Numerical Aperture	0.45 – 0.63
Lens Reduction Ratio	5:1
Exposure Field	22 x 22 mm
Substrate Size Options	75, 100, 125, 150, 200 mm
Dimensions (W x D x H)	1.9 x 2.6 x 2.45 m

* = Option Required

Multi-Wafer Size Handling Kits allow quick changeover between two wafer sizes
75 ↔ 100 mm, 100 ↔ 150 mm, 150 ↔ 200 mm

FPA-3030EX6

FPA-3030EX6 [30EX6] Deep UV (DUV) Steppers, provide a low cost alternative to Scanners for aggressive customers seeking high-resolution imaging. The EX6 can also be configured to handle different substrate materials, sizes and thicknesses required for fabricating advanced analog, sensor, RF and power devices as well as emerging Internet-of-Things (IoT) applications with special wafer requirements.
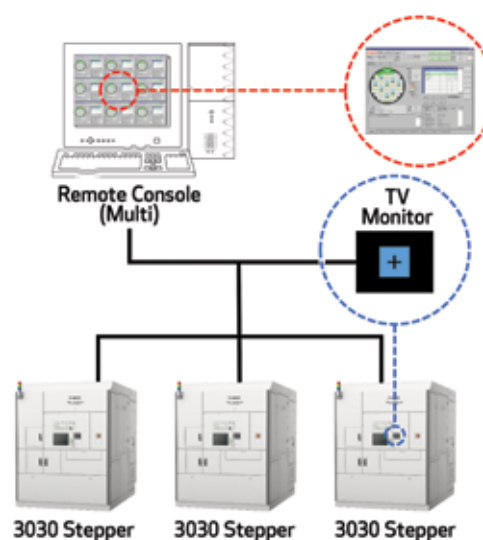
FPA-3030EX6 Steppers offer the highest level of performance among KrF (Krypton Fluoride) Excimer Laser Steppers and are a long-term solution for growing industry demands.
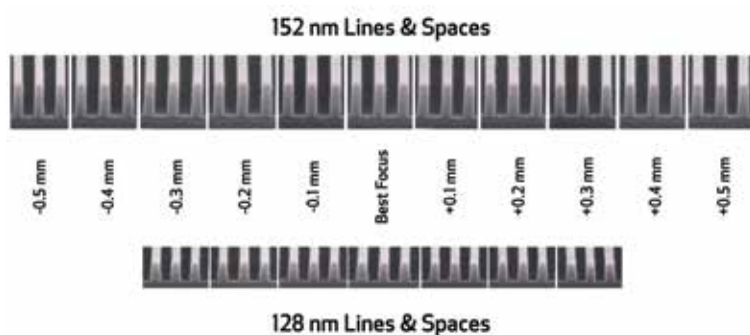
FPA-3030EX6 FEATURES

- 248 nm exposure wavelength Stepper
- Resolution ≤ 150 nm
- Single Machine Overlay ≤ 25 nm
- Substrate handling capability: 75, 100, 150, 200 mm
- e-Console Software supports advanced automation and remote operation functions

KEY OPTIONS

- PC Remote Console
- Through Silicon Alignment (TSA) Scope
- Multi-Wafer Size Handling Kit
    - 75 & 100 mm, 100 & 150 mm, 150 & 200 mm
- Warped/Bonded/Transparent Wafer Handling
- Enhanced AGA (EAGA, die-by-die overlay)
- Canon Internal Metrology (CanoMap)

e-Console Software supports Remote Console control and troubleshooting of fleets of tools from remote locations.

FPA-303EX6 DUV (KrF, 248 nm) Steppers provide cost-efficient high-resolution imaging on ≤ 200 mm substrates for sensor, power and IoT applications.

SPECIFICATIONS	
Technology	KrF Stepper (248 nm)
Resolution	≤ 150 nm
Throughput	≥ 121 wph (200 mm)
Single Machine Overlay	≤ 25 nm
Numerical Aperture	0.50 – 0.65
Lens Reduction Ratio	5:1
Exposure Field	22 x 22 mm
Substrate Size Options	75, 100, 125, 150, 200 mm
Dimensions (W x D x H)	1.9 x 3.0 x 2.45 m

* = Option Required

FPA-3030i5+	FPA-3030EX6	FPA-5510iX	FPA-5520V	FPA-5550iZ2	FPA-6300ESW	FPA-6300ES6a	Litho Product	
≤ 350 nm	≤ 150 nm	≤ 0.5 µm	≤ 1.0 µm	≤ 280 nm (2/3 Ann.)	≤ 130 nm	≤ 90 nm	Resolution	
≤ 40	≤ 25	≤ 50	≤ 150	≤ 15 / ≤ 20*	≤ 9	≤ 3* / ≤ 5*	SMO MMO [nm]	
≥ 105	≥ 121	≥ 145	≥ 160	≥ 230*	≥ 210	≥ 260*	Throughput [upg]	
26 × 33	22 × 22	50 × 50	52 × 34	26 × 33	33 × 42.2	26 × 33	Exposure Field Size [mm]	
≤ 200	≤ 200	300	300	200 300	200 300	200 300	Substrate Sizes [mm]	
				✓			OAS2	Overlay Improvement
		✓		✓			CF-OAS2	
		✓	✓	✓	✓	✓	Wide-Band OA Scope (WB-OAS)	
✓			✓				Through-Silicon Alignment (TSA-Scope)	
				✓			Non-linear Overlay Comp. (EAGA-FL)	
	✓	✓	✓	✓	✓	✓	Enhanced AGA (die-by-die overlay, EAGA)	
				✓			Reticle Thermal Expansion Comp. (RTEC)	
						✓	Shot-Shape High-Order Correction (SSHOC)	
						✓	Each Shot High-Order Correction (ESHOC)	
					✓	✓	AFIS Illumination System	Imaging Improvement
						✓	Focus Accuracy Improvement (F-MAP)	
						✓	Focus Spot Auto Chuck Cleaning	
						✓	CD Uniformity Improvement	
		✓		✓			Oxygen Conc. Control (OCCS)	
✓	✓	✓	✓	✓	✓	✓	Pellicle Particle Checker	
			✓				Illumination System Purge Unit	
		✓	✓	✓			Resist Outgas Exhaust System	
			✓				Warped Substrate Handling	Substrate Handling
			✓				Bonded Substrate Handling	
✓			✓				Transparent Substrate Handling	
✓							Multi-Wafer Size Handling	
					✓	✓	SMIF Over Head Transport (OHT)	
			✓				Wafer Edge Shield / Exposure (WES / WEE)	
✓	✓	✓	✓	✓	✓	✓	Canon Internal Metrology (CanoMap)	Software
			✓				Dual-Side Overlay Metrology (DMAP)	
✓	✓	✓	✓	✓	✓	✓	PC Remote Console	
✓	✓	✓	✓	✓	✓	✓	Online Functions (GEM)	

✓ Compatible

FPA-1100NR2 Mask Replication System

FPA-1100NR2 [NR2] Nanoimprint Lithography (NIL) systems are the world's first mass-production equipment designed for nanoimprint mask replication. NR2 Mask Replication Systems duplicate lithography masks utilizing low-cost NIL technology.

Canon Jet & Flash Imprint Lithography (J-FIL) Nanoimprint Process

FPA-1200NZ2C Wafer Imprint System

FPA-1200NZ2C [NZ2C] NIL cluster tools has been introduced in semiconductor memory mass production lines. NZ2C NIL systems are designed to enable semiconductor manufacturing of circuit patterns as small as 10 nm.

NIL process equipment uses an array of Piezo actuators to apply mag correction and localized intra-field heat input to improve overlay matching accuracy.

MPAsp-E813H Flat Panel Exposure System (Gen 6)

MPAsp-E813H Flat Panel Exposure Systems help realize mass-production of high-definition displays for smartphones, smartwatches and AR/VR headsets on Generation 6 glass plates (1,500 x 1,850 mm).

MPAsp-E813H FEATURES

- MPAsp-E813H Systems adopt upgraded mirror optical and illumination system designs to achieve resolution of 1.5 μm for Line & Space patterns (L/S) and 2.0 μm for Contact Holes (CH)
- MPAsp-E813H ultra-thin glass plate handling technology can support 0.3 mm thick panels
- MPAsp-E813H magnification correction mechanisms and temperature control system support high-accuracy overlay

MPAsp-H1003T Flat Panel Exposure System (Gen 8)

Canon's new MPAsp-H1003T [H1003T] Flat-Panel Exposure system was developed to support production of large, high-definition displays. The H1003T is capable of resolving 2.0 micrometer features across Generation 8 glass panels (2,200 x 2,500 mm), enabling one-shot exposure of 65-inch high-definition displays.

MPAsp-H1003T FEATURES

- MPAsp-H1003T Exposure Systems employ a new projection optical system and proprietary Canon technology to enlarged the exposure area
- MPAsp-H1003T Systems enable manufacturing of large displays without pattern stitching
- MPAsp-H1003T simultaneous multipoint alignment and magnification compensation systems correct for non-linear errors (distortion)

Large-Diameter High-Precision Concave Mirror*
(1.514 mm diameter, ~ 5 ft)

FPD Lithography Equipment for
Generation 8 Glass Substrates*

SPECIFICATIONS	
Technology	Mirror Projection Optical
Resolution	≤ 1.5 μm
Overlay	≤ 0.3 μm
Lens Reduction Ratio	1:1
Substrate Size Options	1,500 x 1,850 mm
Dimensions (W x D x H)	8 x 9.9 x 5.7 m

SPECIFICATIONS	
Technology	Mirror Projection Optical
Resolution	≤ 2.0 μm
Overlay	≤ 0.45 μm
Lens Reduction Ratio	1:1
Substrate Size Options	2,200 x 2,500 mm
Dimensions (W x D x H)	10.5 x 12.1 x 5.9 m

* Source = http://www.canon.com/technology/now/lithography/fpd.html

Canon ANELVA Physical Vapor Deposition (PVD), Etch Systems and Components

Canon U.S.A. provides sales, marketing, service and engineering support for products manufactured by Canon ANELVA Corporation. Canon ANELVA develops and manufactures Physical Vapor Deposition (PVD) and etching equipment for use in semiconductor, storage media and display production lines.

ANELVA PRODUCTS TARGET APPLICATIONS

ANELVA Product	Technology/ Environment	Key Features and Options	Process	Substrate Options	MRAM	Logic & MPU/GPU	3D-NAND & DRAM	HDD & SCM	Power & Automotive	Waveguide & RF	Advanced Packaging	Optics & Photonics	MEMS, Sensors & IoT	AV/VR & Display	LED, MicroLED
NC7900	UHV PVD Cluster HVM	Oblique & Multi-Cathode	Planar & Perpendicular MTJ	300 mm	✓										
NC8000	Ion Beam Etching Cluster HVM	Optimized Ion Source Optical Endpoint Control	Planar & Perpendicular MTJ	300 mm	✓										
EC7800	UHV PVD Cluster R&D & Small Scale	Oblique & Multi-Cathode	Planar & Perpendicular MTJ	300 mm	✓										
EC8000	Dry Etch Cluster R&D	Integrated Dry Etch & CVD	Planar & Perpendicular MTJ	300 mm	✓										
FC7100	UHV PVD Cluster HVM	Damage-less Deposition	Planar Metal Gate	300 mm		✓	✓								
IC7500	UHV PVD Cluster HVM	Reactive PVD & High-Stress Materials	Metal Interconnect	300 mm	✓	✓	✓								
IC7200	UHV PVD Cluster HVM	Reactive PVD & High-Stress Materials	Metal Interconnect	200 mm	✓	✓	✓	✓	✓	✓		✓	✓		✓
IC7400	PVD Cluster HVM	Low-Temp Damage-less Deposition	Under Bump Metallization (UBM)	300 mm	✓	✓	✓				✓				
EL3400	Vertical Inline PVD HVM	Single or Dual-Side Deposition, Multiple Target	Barrier & Copper Seed layer	650 x 650 300 mm x 4	✓	✓	✓				✓			✓	
HC7100	UHV PVD Cluster HVM	Oblique and Multi-Cathode	TMR & GMR MR Sensors	200 mm					✓	✓		✓	✓		✓
ML3000	Inline PVD System	High-Vacuum Quality High-Temp Heating/Cooling	Magnetic Media Next Gen Media	1,800 disks per hour					✓	✓		✓	✓		✓
HC7300	PVD System HVM	Integrate PVD, Milling, Insulation, Hard Bias & Cap	Magnetic Head	200 mm					✓	✓		✓	✓		✓
EB1000	Compact PVD R&D & Small Scale	3 Cathodes, High-Temp Co-Sputtering	General Purpose PVD	≤ 100 mm					✓	✓		✓	✓		✓
EB1100	High-Performance PVD R&D & Small Scale	4 Cathodes, High-Temp Co-Sputtering	General Purpose PVD	≤ 220 mm					✓	✓		✓	✓		✓
EC7000	Compact PVD Cluster R&D & Small Scale	4 Cathodes, 2 Chambers Load Lock and Transfer	High-Flexibility & Productivity PVD	≤ 220 mm					✓	✓		✓	✓		✓
EC7400	Compact PVD Cluster R&D & Small Scale	4 Cathodes Space Saving Design	Electronic Components	≤ 200 mm					✓	✓		✓	✓		✓
EC3000	Batch PVD System HVM	4 Cathodes Rotary Deposition	ITO Film & Metal Electrode	≤ 200 mm					✓	✓		✓	✓		✓
EC8100	Tray Transport PVD HVM	3 PVD Chambers Damage-Less Deposition	ITO Film & Metal Electrode	≤ 200 mm					✓	✓		✓	✓		✓
EL3200	Horizontal Inline PVD HVM	3 Cathodes, Top, Bottom or Dual-Side Deposition	Printed Circuit Board	300 x 450 mm	✓	✓	✓				✓			✓	
EC7200	Annealing System R&D & HVM	Electron Bombardment High-Temperature Vacuum Anneal	SiC Power Device Activation	≤ 150 mm					✓						
X-Ray Source	Microfocus X-Ray R&D & HVM	High-Power, High-Speed & High-Resolution	Radioscopy X-Ray CT	NA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Vacuum Components	Components R&D & HVM	Pumps, Gauges, leak detectors, spectrometers, electron gun	Low-Vacuum UHV	NA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

✓ Compatible

Canon ANELVA develops & manufactures highly reliable Physical Vapor Deposition (PVD) & Ion Beam Etching (IBE) & Dry Etching equipment to provide nanometer level processing required for a large scale integration of semiconductor devices including Magnetic Random Access Memory (MRAM).

NC7900

Ultra-High Vacuum (UHV) PVD cluster tool for 300 mm MRAM high-volume manufacturing.

Features:
- Compatible with planar and perpendicular Magnetic Tunnel Junction (MTJ) formation
- High throughput (≥ 25 wph for perpendicular MTJ)
- Oblique and multi-cathode PVD chambers with extensive module line up such as heating, cooling, and pre-cleaning
- Fine interface control with ultra-thin multi-layers

NC8000

Ion Beam Etching (IBE) cluster tool for 300 mm MRAM high-volume manufacturing.

Features:
- Optimized ion beam source
- High etching performance with high productivity
- Clampless holder with 2-axis revolution and stage angle
- Optical end point detection system for precise etching depth control

EC7800

Ultra-High Vacuum (UHV) PVD cluster tool for 300 mm R&D and small scale MRAM production.

Features:
- Low pressure remote Pplasma sputtering technology delivering ultrathin multilayer stacks
- An order of magnitude lower pressure discharge (0.02 Pa) than conventional PVD processes
- Excellent film thickness uniformity (< ± 1%)
- Smooth and low resistance films
- Provides high Magneto-Resistance (MR) ratio with excellent distribution
- Oblique and multi-cathode PVD chambers with extensive module line up such as heating, cooling, and pre-cleaning

EC8000

Dry etching cluster tool for 300 mm MRAM R&D.

Features:
- Integrated processing –MTJ dry etching and protective film Chemical Vapor Deposition (CVD)
- Low-damage process with CH_3OH gas
- Enables micro-patterning with less shorts (high yield)
- Capable of retaining a high Magneto-Resistance (MR) ratio even after etching
- Easy maintenance and flexible equipment configuration

FC7100

Ultra-High Vacuum (UHV) PVD cluster tool provides planar metal gate deposition for 300 mm high-volume manufacturing.

Features:
- Suitable for planar metal gate deposition
- Precise control of film thickness (~ 0.1 nm)
- Excellent thickness uniformity ($1\,\sigma < 1\%$)
- Film composition control
- Small size cathode for low material cost

IC7500

Ultra-High Vacuum (UHV) PVD cluster tool for metal interconnect fabrication in 300 mm high-volume manufacturing of semiconductor memory.

Features:
- Excellent uniformity and low particles even for reactive PVD processes and high stress materials
- High productivity to reduce production cost
- World's High Throughput (80 wph)
- Uptime > 90% (Failure time < 1%)
- Cathode magnet position change through recipe facilitates easy optimization

IC7200

Ultra-High Vacuum (UHV) PVD cluster tool for metal interconnect processes in 200 mm high-volume manufacturing of semiconductor memory.

Features:
- High reliability 200 mm cluster tool
- Excellent uniformity and low particles even for reactive PVD processes and high stress materials
- Cathode magnet position change through recipe facilitates easy optimization
- Add-on options for step coverage improvement and plasma damage reduction

IC7400

PVD cluster tool for Under Bump Metallization (UBM) processes in 300 mm high-volume memory packaging.

Features:
- Used by leading suppliers of 300 mm UBM processes
- Stress control
- Low temperature deposition
- Damage-less deposition
- Improved adhesion
- Easy to customize hardware

EL3400

Panel PVD System for Advance Packaging applications including barrier and Copper seed deposition.

Features:
- Vertical linear transport system
- Compatible with various substrates (Si, glass, organic, …)
- Large deposition area (□ 650 mm x 2 panels, Φ 300 mm x 8 wafers, □ 300 mm x 8 panels)
- Moisture control
- Plasma surface activation for superior adhesion
- Single side or double side deposition
- Multiple targets for multilayer deposition

Canon ANELVA commands the world's largest market share of the PVD equipment used for production of high density magnetic heads & disks for use in PCs & servers. Using proprietary technology, Canon ANELVA intends to continue our technology leadership in the evolution of hard disk drives & innovative storage media.

HC7100

200 mm PVD cluster tool production of MagnetoResistive (MR) magnetic sensors.

Features:
- Compatible with Tunnel Magneto-Resistance (TMR) and Giant Magneto-Resistance (GMR) processes
- An order of magnitude lower pressure discharge (0.02 Pa) than conventional PVD processes
- Excellent film thickness uniformity (< ± 1%)
- Smooth and low resistance films
- Provides high Magneto-Resistance (MR) ratio with excellent distribution
- Oblique and multi-cathode PVD chambers with extensive module line up such as heating, cooling, and pre-cleaning

ML3000

Inline PVD tool for R&D & mass production of next generation Hard Disk Drive (HDD) magnetic media.

Features:
- High productivity (up to 1,800 disks/hr) with a 90 m^2 footprint
- Over 10 days of continuous operation is possible
- Emphasis on vacuum (~ 10^{-6} Pa) quality to improve magnetic characteristics of media
- High temperature heating and cooling units for the development of next generation thermally assisted magnetic recording media

HC7300

PVD tool for Hard Disk Drive (HDD) magnetic head production.

Features:
- Effectively consolidates magnetic head production processes – milling ➔ insulator ➔ hard bias ➔ cap layer
- Module lineup enables optimum shape required by read element (IBE, anisotropic deposition, isotropic deposition, RIE, etc…)
- Excellent deposition characteristic and high productivity

Canon ANELVA Electronic Device Manufacturing Equipment

Canon ANELVA's versatile device lineup supports next generation technology development and manufacturing of thin film devices such as Light Emitting Diodes (LEDs), CMOS Image Sensors, Compound Semiconductors, Piezoelectric Devices, and Power Devices.

EB1000

Compact and flexible PVD system for ≤ 100 mm general purpose R&D applications.

Features:
- Three Φ 2" compact cathodes
- Various deposition geometries (offset rotation, static) by tray transport
- Supports substrates up to Φ 100 mm
- High temperature (800 °C) substrate heating (option)
- Load lock chamber (option)
- Ternary co-sputtering (option)
- Auto-pumping and manual transportation/deposition operation
- Space saving design (standard footprint W 1.8 m x D 1.1 m x H 1.55 m)

EB1100

High-performance PVD system for ≤ 220 mm R&D and small scale production.

Features:
- Fully automated operation
- Supports up to four Φ 4" cathodes
- Supports substrates up to Φ 220 mm
- Various deposition geometries (offset rotation, static) by tray transport
- High temperature (800 °C) substrate heating (option)
- Space saving unit body design (standard footprint W 1.45 m x D 1.6 m x H 1.85 m)
- Co-sputtering (option)

EC7000 SERIES

Compact PVD cluster system for ≤ 220 mm R&D and small scale production of LEDs, Compound Semiconductors, and Power Devices.

Features:
- Equipped with load lock stocker chamber and transfer chamber
- Supports up to two sputtering chambers
- Fully automated operation
- Supports up to four Φ 4" cathodes
- Supports substrates up to Φ 220 mm
- Various deposition geometries (offset rotation, static) by tray transport
- High temperature (800 °C) substrate heating (option)
- Space saving unit body design (standard footprint W 1.45 m x D 2.3 m x H 1.85 m)
- Co-sputtering (option)

EC7400

Compact cluster tool for ≤ 200 mm production of electronic components such as SAW Filters, TC-SAW Filters, Piezoelectric Devices, and Power Devices.

Features:
- Fully automated operation
- Able to accommodate a variety of process modules according to requirements
- High target utilization
- Substrate size up to Φ 200 mm
- Up to four Φ 7.1" cathodes
- Space saving design

EL3000 SERIES

Batch type PVD system for LED production.

Features:
- Ideal for Indium Tin Oxide (ITO) transparent conductive film deposition, metal electrode film deposition, etc.
- Rotary deposition facilitates batch processing of multiple wafers and good uniformity
- Fully automated operation
- Supports substrates up to Φ 200 mm
- Tray transport (50 Φ 2" wafers/batch)
- Supports up to four Φ 7.1" or Φ 12.5" cathodes
- High target utilization to help reduce cost
- Customizable configuration according to application and production volume

EC8100

Tray Transport PVD cluster system for small wafer and LED production.

Features:
- Ideal for Indium Tin Oxide (ITO) transparent conductive film deposition, metal electrode film deposition, etc.
- Long distance sputtering
- Excellent uniformity over large area
- Multiple wafers deposition per batch (four Φ 8", eight Φ 6", etc.)
- High target utilization
- Fully automated operation
- Up to three sputtering chambers

EL3200

Horizontal linear transport PVD system for production of electronic components such as Sensor Devices.

Features:
- Configurable for single side or dual-side deposition according to production volume
- Supports laminated films by using up to 3 (single side) cathodes
- Can accommodate up to 25 trays in the stocker chamber
- Pre-heating chamber (Option)
- 300 mm x 450 mm effective deposition area

EC7200

Electron Bombardment vacuum annealing tool for SiC power device activation in ≤ 150 mm R&D and mass production.

Features:
- High temperature (up to 1850 °C) process for implant activation
- In situ carbon capping for low surface roughness
- Clean vacuum
- Cluster tool configuration that supports up to three annealing chambers
- Substrate size up to Φ 6"
- Excellent repeatability (sheet resistance uniformity ± 4.9% @ 1,000 runs)
- High electrical activation, low sheet resistance, reduction of diode leakage current, and low surface roughness

Thin-Film manufacturers and R&D facilities use Canon ANELVA vacuum components as virtually indispensable parts in systems incorporating vacuum technology. Canon ANELVA vacuum technology contributes to stable operation of equipment and measuring instruments.

X-RAY SOURCE

Sealed, transmissive-type, high-power, high-speed, micro-focus X-ray source for high-resolution imaging.

Features:
- Radioscopy, X-ray Computer Tomography (CT), and Automated X-ray Inspection (AXI) applications[†]
- Thin (0.29 mm) diamond window
- High resolution and high power simultaneously
- Wide (168°) X-ray cone angle
- Quick warm-up (≤ 3 min)
- Fast image capture (0 kV to 110 kV within 1 sec)
- Pulse mode (option)

[†] = X-ray sources are developed specifically for industrial use and cannot be used in food, beverage or human medical imaging

QUADRUPOLE MASS SPECTROMETERS

Versatile instruments used to monitor process gases and analyze residual, inorganic and desorbed gases.

Available Products:
- Compact gas analysis system, D-series (M-101/201/400GA-D Series)
- Process gas monitor (M-080QA-HPM)
- Transducer type spectrometer (M-070QA-TDF, M-101QA-TDF, M-101/201QA-TDM)
- High speed and high sensitivity spectrometer (M-401QA-MU/G)

LEAK DETECTORS

Canon ANELVA helium leak detectors support a variety of quality control applications requiring high sealing performance.

Features:
- Used by customers in a variety of industries
- Compact, lightweight, and portable design
- Various models available to choose from
- Simple operation
- High sensitivity, stability, and response
- Uses a tungsten filament to help enable long term high-sensitivity measurement

VACUUM PUMPS

Canon ANELVA offers a wide range of vacuum pumps from low-vacuum to ultra-high-vacuum applications and high efficiency cryopumps.

Available Products:
- Ion pumps/noble pumps
- Excel pumps
- Titanium sublimation pump/tie-back pumps
- Combination pumps
- Cryopumps
- Cryogenic traps
- Air cooled freezer module
- Foreline traps
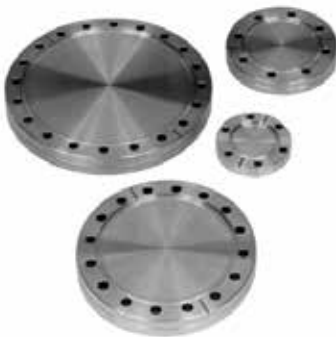- Screw type dry pumps
- Roots type dry pump

VACUUM FEEDTHROUGHS

Vacuum Feedthroughs can be used to introduce rotary and/or linear motion to a device installed in vacuum.

Available Products:
- Magnetic Coupling Type Rotary Feedthrough
- Bellows Type Rotary Feedthrough
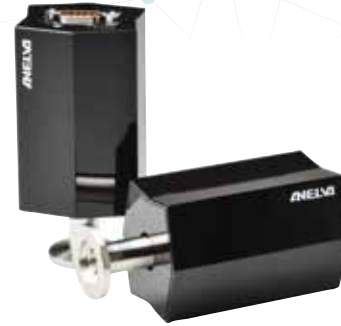- Linear Feedthrough
- R/L Feedthrough
- Current Terminal

VACUUM GAUGES AND CONTROLLERS

Canon ANELVA offers a diverse lineup of gauges to meet a variety of application requirements.

Available Products:
- Cold Cathode Gauge (M-370CG)
- Cold Cathode Pirani Gauge (M-361CP)
- Capacitance Diaphragm Gauge (M-342DG)
- Pirani Gauge (M-350PG)
- Corrosion-resistant Pirani Gauge (M-351PG)
- Ion Gauge (M-311HG)
- Crystal Ion Gauge (M-336MX)
- Crystal Gauge (M-320XG)
- Wide Range Ionization Vacuum Gauges (M-431HG, M-833HG)
- Ionization Vacuum Gauge (M-723HG, M-823HG, M-923HG)
- Thermocouple Vacuum Gauge (M-012DM)
- Miniature Gauge (MG-2, MG-2M, MG-2F, MG-2/WF)
- Vacuum Gauge (Shultz, B-A, Nude Ion, Pirani, Thermocouple)

VACUUM PARTS

Canon ANELVA offers various high quality ancillary vacuum parts to support your vacuum systems.

Available Products:
- Ultra-High Vacuum (UHV) flange
- Fittings and adaptors with ICF flange
- Quick release couplings
- Vacuum switch
- UHV view ports
- Sheathed heater and moly paste

VACUUM VALVES

Canon ANELVA offers a variety of vacuum valves.

Available Products:
- UHV Type-L All-metal Valve
- UHV Type-L Polyimide Valve
- "V Series" Roughing pump valve V-025RV
- "V Series" Type-L Valves V-040LV/ V-065LV/ V-100LV
- UHV Variable Leak Valve
- Inlet valve
- Leak valve
- Isolate Valve V-025SV
- UHV Gate Valve MSB Series
- UHV Gate Valve STD Series

Canon Optomechatronic Products blend optics, analytics, motion control technology to enable advanced and automated processes. Canon has been developing industrial components with precision and accuracy using optical technology developed and accumulated for over half a century.

OPTOELECTRONICS

Canon Optoelectronics integrate optical and electronic technologies with precise fabrication to produce a line of products for advanced R&D and production.

Available Products:
- Digital Laser Scanner System
- Optical Digital Laser Rotary Encoder
- Interpolator Board
- Laser Doppler Velocity Sensor
- Custom Design Encoders

GM-1020

GM-1015

GM-100

GM-1005

GM-1000 Series Digital Galvano Motors support beam diameters between 5 and 30mm.
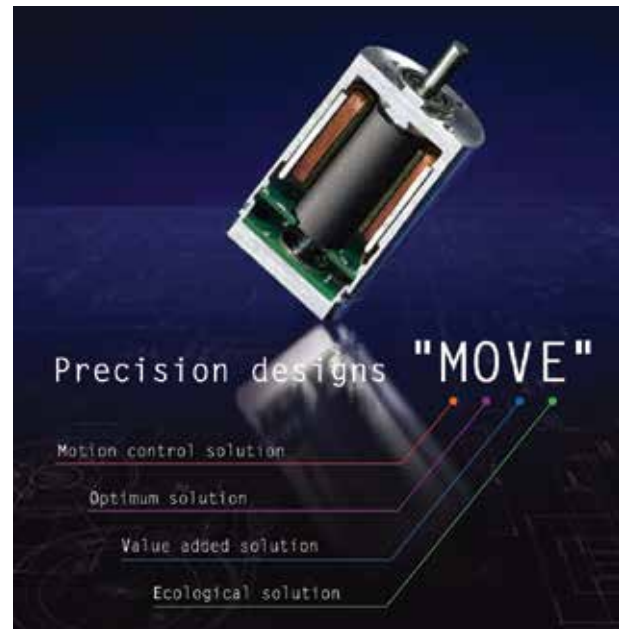

MOTION CONTROL PRODUCTS

Canon's DC Micro-Motors can be found in robotic systems, semiconductor process equipment, sporting equipment, ATMs, medical devices and pumps.

Available Products:
- Brushless Motors
- Coreless Motors
- Iron Core Motors
- Actuator Units

Options such as gear units and encoders can be added to Canon motors. Speed, reduction rate and other parameters can be customized to fit your exact requirements.
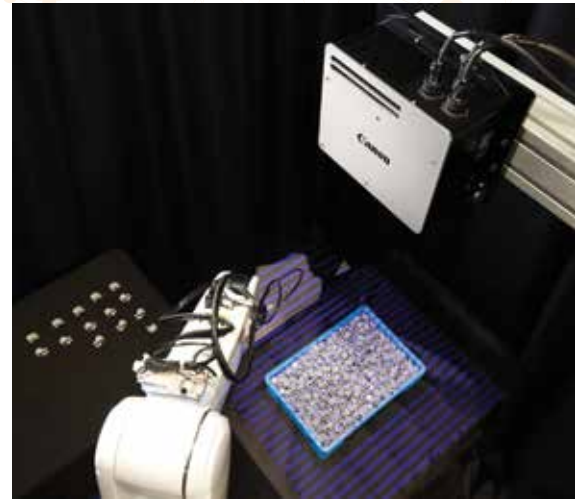
3-D MACHINE VISION SYSTEM (RV-SERIES)

RV-Series 3-D Machine Vision Systems are designed to work with robotic arm systems as an "eye" for three-dimensional recognition of the position and orientation of objects and to instruct the robotic system how to approach and pick up individual parts.

Features:
- 3-Dimensional, Image Recognition of Target Parts
- Simple and Easy Preparation with CAD data and Image File
- One-time Measurement of 3-D Pose
- Position and Orientation: 6 Degrees of Freedom

Canon's 3-D Machine Vision System was developed in response to the manufacturing industry need for a solution for 3D robotic random bin picking.
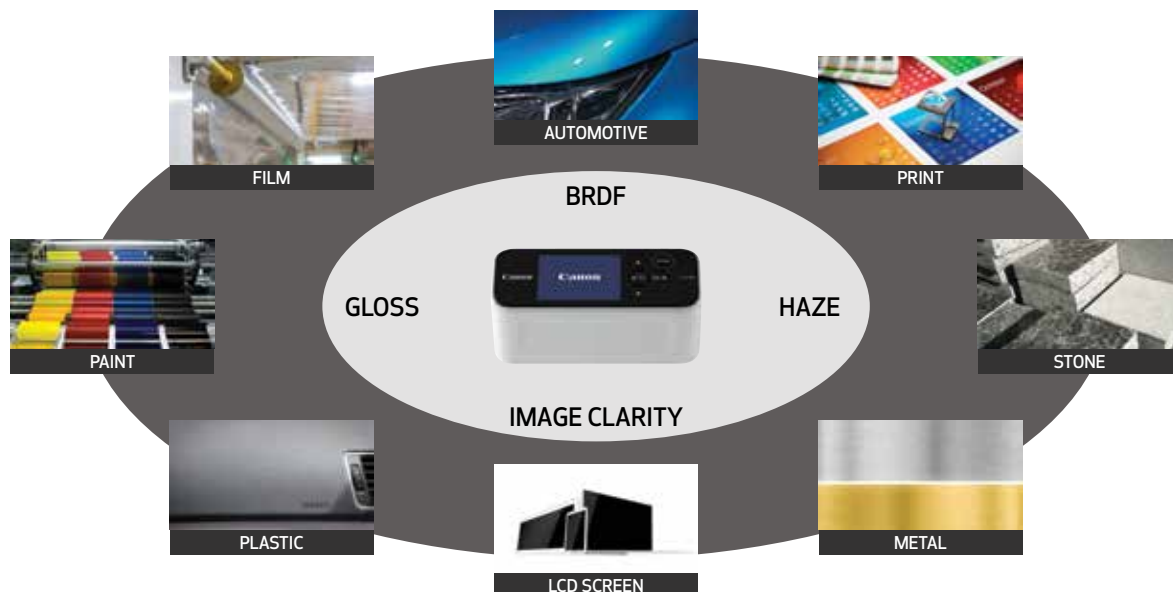

SURFACE REFLECTANCE ANALYZER

Canon's RA-532H Surface Reflectance Analyzer is a portable measuring device to evaluate surface conditions of objects including standard compliant Gloss, Haze, Image Clarity and 2-D BRDF measurements.
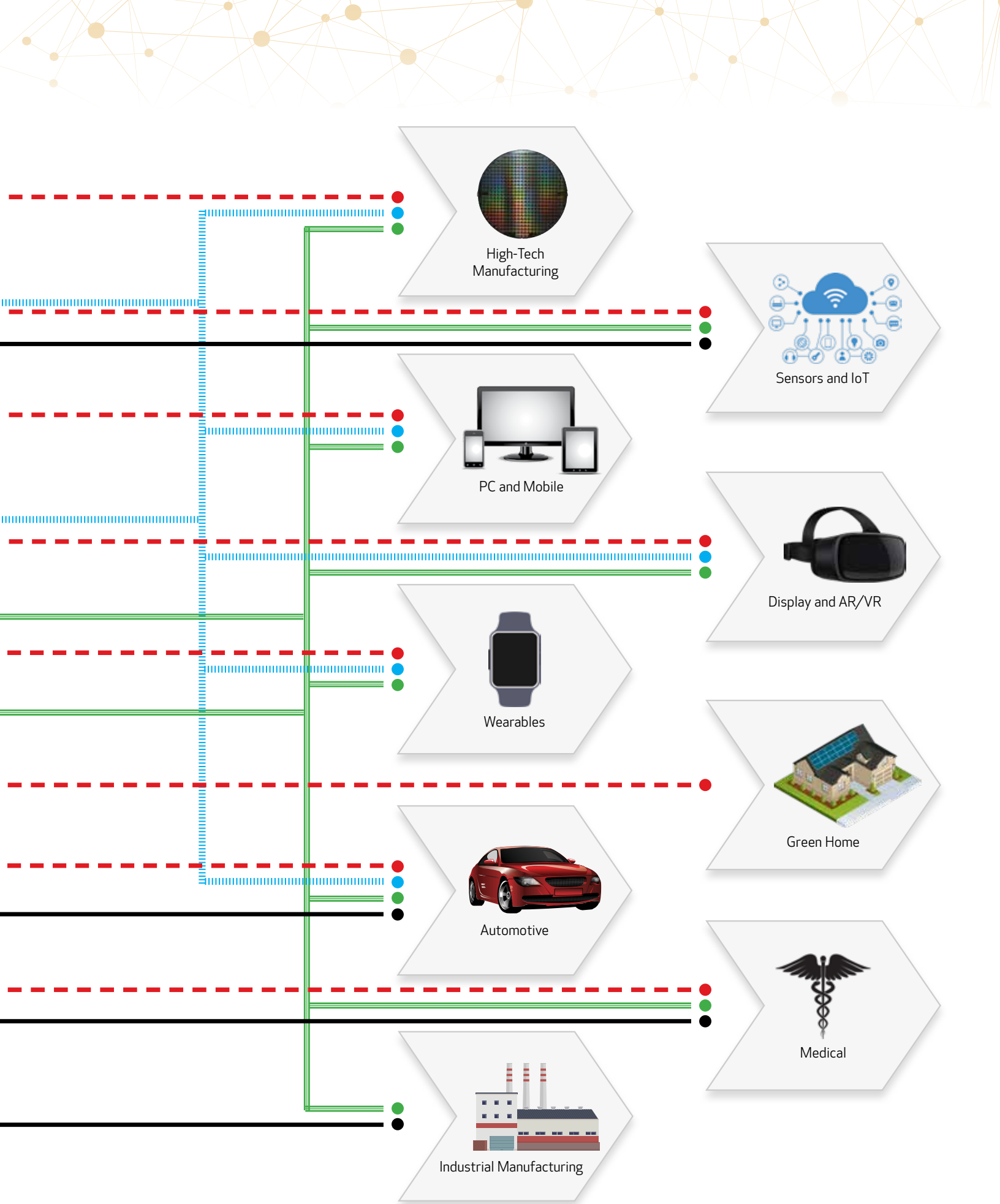
Features:
- Single analysis for 4 surface conditions: Gloss, Haze, Image Clarity, and Bidirectional Reflectance Distribution Function (BRDF)
- 2-D BRDF measurement in the palm of your hand
- Outputs the angular distribution of incident reflected light intensity
- Monitoring camera function displays measurement area results

Industries With a Need for Surface Appearance Quality Measurement

FILM

AUTOMOTIVE

PRINT

BRDF

PAINT

GLOSS

HAZE

STONE

IMAGE CLARITY

PLASTIC

LCD SCREEN

METAL

Litho Products

Flat-Panel Exposure

ANELVA PVD
and Etch

ANELVA Panel
Products

X-Ray Source

Vacuum Components

Optoelectronic
Products

DC Micro Motors

3-D Machine Vision

Surface Reflectance
Analyzer

High-Tech
Manufacturing

Sensors and IoT

PC and Mobile

Display and AR/VR

Wearables

Green Home

Automotive

Medical

Industrial Manufacturing

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